



**US Army Corps  
of Engineers®**

Walla Walla District

# Lower Snake River Juvenile Salmon Migration Feasibility Study

## **Draft Feasibility Report/ Environmental Impact Statement**

December 1999



Lower Snake River Juvenile Salmon  
Migration Feasibility Study

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Comments must be received: The official closing date for the receipt of comments is  
31 March 2000.

Abstract: Public comments are sought on this draft FR/EIS.

The Corps of Engineers along with the Bonneville Power Administration, U.S. Environmental Protection Agency, and U.S. Bureau of Reclamation as cooperating agencies, analyzed four general alternatives intended to provide information on the technical, environmental, and economic effects of actions related to improving juvenile salmon passage. The four alternatives include Alternative 1—Existing Conditions (the no-action alternative) and three different ways to further improve juvenile salmon passage. The action alternatives are: Alternative 2—Maximum Transport of Juvenile Salmon, Alternative 3—Major System Improvements, and Alternative 4—Dam Breaching. Comparison of the alternatives by all of the factors assessed in the study has not offered a clear-cut recommendation at this time. It is the Corps of Engineer's intent to recommend a preferred plan of action in the Final FR/EIS.

Note: Blue rectangles indicate links to appropriate files.



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# Acronyms and Abbreviations

$\lambda$	(lambda) population growth rate
°F	degrees Fahrenheit
$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
AAQS	ambient air quality standards
ACHP	Advisory Council on Historic Preservation
AIRFA	American Indian Religious Freedom Act
AMPA	aminomethylphosphoric acid
aMW	average megawatt
ARPA	Archaeological Resources Protection Act
BA	Biological Assessment
BGS	behavioral guidance structure
BIA	Bureau of Indian Affairs
BKD	bacterial kidney disease
BLM	Bureau of Land Management
BNSF	Burlington Northern – Santa Fe Railroad
BOD	biochemical oxygen demand
BOR	U.S. Bureau of Reclamation
BOT	Board of Trustees
BP	before present
BPA	Bonneville Power Administration
BSM	Bayesian Simulation Model
CAA	Clean Air Act
CBFWA	Columbia River Fish and Wildlife Authority
CCAP	U.S. Climate Change Action Plan
CEAA	Canadian Entitlement Allocation Agreement
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CEQ	Council on Environmental Quality
CFC	chlorofluorocarbons
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH <sub>4</sub>	methane
CO	carbon monoxide
CO <sub>2</sub>	carbon dioxide
Comp Plan	Lower Snake River Fish and Wildlife Compensation Plan
Corps	U.S. Army Corps of Engineers

## Acronyms and Abbreviations (continued)

CR	County Road
CRI	Cumulative Risk Initiative
CRBG	Columbia River Basalt Group
CRMP	Cultural Resources Management Plan
CRFMP	Columbia River Fish Mitigation Program
CRITFC	Columbia River Intertribal Fish Commission
CSPE	Columbia Storage Power Exchange
CTCIR	Confederated Tribes of the Colville Indian Reservation
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
CWA	Clean Water Act
DO	dissolved oxygen
DREW	Drawdown Regional Economic Workgroup
DREW HIT	Drawdown Regional Economic Workgroup Hydropower Impact Team
DSI	direct service industries
Ecology	Washington State Department of Ecology
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESBS	extended submerged bar screen
ESL	Endangered Species List
ESU	Evolutionarily Significant Unit
EWITS	Eastern Washington Intermodal Transportation Study
FCRPS	Federal Columbia River Power System
Feasibility Study	Lower Snake River Juvenile Salmon Migration Feasibility Study
FELCC	firm energy load-carrying capacity
FERC	Federal Energy Regulatory Commission
FGE	fish guidance efficiency
FIRFA	Federal Insecticide, Fungicide, and Rodenticide Act
FPC	Fish Passage Center
FPE	fish passage efficiency
FR	Federal Register
FR/EIS	Lower Snake River Juvenile Salmon Migration Study Feasibility Report and Environmental Impact Statement
ft/sec	feet per second
FWCA	Fish and Wildlife Coordination Act

## Acronyms and Abbreviations (continued)

FWCAR	Fish and Wildlife Coordination Act Report
GBT	gas bubble trauma
GHG	greenhouse gas
GIS	geographic information system
GSA	General Services Administration
HCFC	partially halogenated fluorocarbons
HEP	Habitat Evaluation Procedure
HMU	habitat management unit
HU	habitat unit
HYDROSIM	Hydro Simulation Program
HYSSR	Hydro System Seasonal Regulation Program
ICBEMP	Interior Columbia Basin Ecosystem Management Project
IPP	Independent Power Producer
JFTP	Juvenile Fish Transportation Program
KAF	thousand acre-feet
kcfs	thousand cubic feet per second
kg/m <sup>2</sup>	kilogram per meter squared
KW	kilowatt
KWh	kilowatt hour
LOA	Letter of Agreement
LWCFA	Land and Water Conservation Fund Act
M&I	municipal and industrial
MAF	million acre-feet
mg/l	milligram per liter
mm	millimeter
MOP	minimum operating pool
msl	mean sea level
MW	megawatt
MWh	megawatt hour
NAGPRA	Native American Graves Protection and Repatriation Act
NED	National Economic Development
NEPA	National Environmental Policy Act
Nez Perce	Nez Perce Tribe
NHPA	National Historic Preservation Act

## Acronyms and Abbreviations (continued)

NMFS	National Marine Fisheries Service
N <sub>2</sub> O	nitrous oxide
NO <sub>2</sub>	nitrogen dioxide
NO <sub>x</sub>	nitrogen oxide
NPPC	Northwest Power Planning Council
NPS	National Park Service
NPTEC	Nez Perce Tribe Executive Council
NRHP	National Register of Historic Places
NTMP	neotropical migratory bird
NTU	nephelometric turbidity unit
O&M	operation and maintenance
O <sub>3</sub>	ozone
OA	Columbia River Salmon Flow Measures Options Analysis
PATH	Plan for Analyzing and Testing Hypotheses
Pb	lead
PCB	polychlorinated biphenyl
PDO	Pacific Decadal Oscillation
PIT	passive induced transponder
PM	particulate matter
PM <sub>10</sub>	particulate matter with aerodynamic diameters less than 10 micrometers
PMOA	Programmatic Memorandum of Agreement
PNCA	Pacific Northwest Coordination Agreement
PNI	Pacific Northwest Index
ppb	parts per billion
ppm	parts per million
PUD	Public Utility District
RCRA	Resource Conservation and Recovery Act
RED	Regional Economic Development
RM	River Mile
RPA	reasonable and prudent alternative
SAR	smolt-to-adult survival ratio
SBC	surface bypass collector
Scenic Area	Columbia River Gorge National Scenic Area
SCS	System Configuration Study
SCT	System Configuration Team

## Acronyms and Abbreviations (continued)

SDWA	Safe Drinking Water Act
Shoshone-Bannock	Shoshone Bannock Tribes
SHPO	State Historic Preservation Office
SNL	speed no load
SO <sub>2</sub>	sulfur dioxide
SOR	System Operation Review
SR	State Route
SRP	Science Review Panel
STS	submerged traveling screen
SWI	simulated Wells Dam intake
TAP	toxic air pollutant
TCR	transport:control ratio
TDG	total dissolved gas
TEQ	toxicity equivalency quotient
TIR	transport to in-river ratio
TMT	Technical Management Team
TPH	total petroleum hydrocarbons
TPY	tons per year
TSCA	Toxic Substance Control Act
TSS	total suspended solid
TVA	Tennessee Valley Authority
UI	University of Idaho
Union Pacific	Union Pacific Railroad
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound
Warm Springs	Confederated Tribes of the Warm Springs of Oregon
WDFW	Washington Department of Fish and Wildlife
WRC	U.S. Water Resources Council
WRDA	Water Resources Development Act
WSCC	Western Systems Coordinating Council
Yakama	Yakama Nation